Requested Patent: GB741660A

Title: IMPROVEMENTS IN OR RELATING TO RADIATION BURNERS ;

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Inventor(s): ;

Applicant(s): RADIANT HEATING LTD;; ARTHUR DOCKING ;

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IPC Classification: ;

Equivalents: ;

ABSTRACT:

A refractory plaque of low heat conductivity for a radiant gas burner is made by mixing materials including exfoliated Vermiculite, China clay and a refractory powder or Sillimanite or Pikes K or like ball clay with water to form a plastic mass, shaping, perforating and then firing the mass. The compositions by weight of two preferred plaques are given.

PATENT SPECIFICATION 741,660

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Index at Acceptance :—**Classes 70**, F(2A1 : 7 : 12) ; **and 75(1)**, TA9.

COMPLETE SPECIFICATION.

Improvements in or relating to Radiation Burners.

We, RADIANT HEATING LIMITED, a British Company, and ARTHUR DOCKING, a British Subject, both of Radiant Works, Barnsbury Park, London, N.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to radiant or surface combustion heaters of the kind in which an inflammable gas or vapour mixture is caused to pass under suitable pressure through a multiplicity of small holes in a thickness of refractory material and burn at the outlet surface of said material. The refractory material is shaped to form a plaque or plaques and several plaques may be cemented together to form a composite plaque or platen.

The object of the invention is to provide a burner of the kind referred to which will operate at high efficiency at the towns or manufactured gas pressures normally available, or with natural gas, propane or butane at appropriately higher pressures.

According to the present invention a method of making a radiant burner plaque of low heat conductivity comprises mixing materials including at the least the following : exfoliated Vermiculite, China clay and a refractory powder or Sillimanite, or Pikes K or like ball clay, with water to form a plastic mass, shaping the mass as desired, perforating the mass to form a multiplicity of passages therethrough and then firing said mass.

In order that the invention may be readily carried into effect plaques embodying the invention and a burner constructed for use with such plaques will now be described in greater detail by way of example with reference to the accompanying drawings in which :

Figure 1 is a sectional elevation of a burner ; and

Figure 2 is a plan view.

Referring to the drawings, the burner consists of a cast iron container 1 having an injector assembly indicated generally at 2 fitted to it. The injector is provided with a tube 3 projecting into the interior of the container and which serves to ensure distribution of the air/gas mixture over the rear surfaces of eight refractory plaques 4. The plaques are cemented together edge to edge so as to form a single composite plaque or platen which is cemented within a recess in the container wall and presents a flat surface at the face thereof.

The refractory plaques are composed of a mixture of the following materials, the percentage values stated being the proportions by weight of the mixture.

Exfoliated Vermiculite ..	30%
Sillimanite	20%
China clay	30%
Pikes K clay	20%

Pikes K clay is a Trade name for a ball clay having a silica content in the region of 52% and 54%, a corresponding alumina content between 32.5% and 31% and a total alkali content of between 2.8% and 3.4%.

The grain size of the Sillimanite used is such that it will pass through a mesh of the order of 100 per square inch. The materials are first mixed dry and then water is added in sufficient quantity to produce, on further mixing, a plastic mass. An appropriate quantity of the plastic mass produced on mixing with the water is placed in a rectangular open box-shaped former so as to form therein a flat plaque. A large number of regularly placed small holes 5 is then punched in the plaque by a tool provided with an appropriate number of pins. The pins are preferably slightly tapered as this facilitates removal of the tool from the plaque and provides a further advantage to be referred to later. The perforating tool employed is preferably constructed to produce in the

[*Price 3s. 0d.*]

finished plaque, about 250 holes per square inch of surface, the diameter of each hole being of the order of 1 millimetre.

The perforated plaque is then removed from its former and fired at a temperature of the order of 800° C. After firing the plaque is ready for cementing to others similarly prepared to form a composite platen as previously referred to.

The dimensions of the fired plaques may conveniently be of the order of 3 inches long, 2 inches wide and ½ an inch thick but it will be understood that they may be of greater or smaller dimensions than those mentioned. The plaques are assembled together so that the larger diameter ends of the holes through them are at the exposed face of the composite platen and it is found that by using slightly tapering holes, when the point of burning of the air/gas mixture tends to recede within the holes, a point is reached at which the velocity of the air-gas mixture is higher than the rate of back-fire and the burning point remains stationary just below the surface of the plaques.

Although reference has been made to the use of tapered holes in the plaques it will be understood that parallel sided holes may be formed in the plaques but in such a case, it may be found necessary in order to obtain satisfactory operation, to use gas pressures higher than those necessary when tapered holes are used.

In using a burner as described, it is mounted for rotation about its axis as it is capable of operating efficiently whether in a vertical or a horizontal position or at any intermediate angle. A pilot jet is mounted at a convenient point near the face of the burner as in present practice in connection with known forms of radiant burner. Burners constructed and operated as described are found to be highly efficient and are silent in operation.

When using towns or manufactured gas, the burners will operate satisfactorily at pressures of 1.5 to 1.8 inches water gauge. If natural gas is used the pressure should preferably be of the order of 4 inches water gauge and if butane or propane is used the pressure should preferably be of the order of 11 inches water gauge.

It is important that the finished plaques shall have low heat conductivity and in order to decrease the conductivity, it may be necessary to increase the proportion of the insulating material used namely the Vermiculite in the example mentioned.

In the case of plaque material composed in accordance with the example described herein and weighing 65 pounds per cubic foot, the thermal conductivity is 1.7 British Thermal Units per square foot per hour per one inch thickness for a temperature difference of 1° F.

In the case of plaques composed of 62% Vermiculite, 19% China clay and 19% Pikes K clay mixed with water before firing, the finished plaque material weighing 45 pounds per cubic foot, the thermal conductivity is 1.2.

What we claim is :—

1. A method of making a radiant burner plaque of low heat conductivity comprising mixing materials including at least exfoliated Vermiculite, China clay and a refractory powder or Sillimanite or Pikes K or like ball clay, with water to form a plastic mass, shaping said mass as desired, perforating said mass to form a multiplicity of passages there through and firing said mass.

2. A method according to Claim 1, in which the composition of said plaque by weight consists of:

Exfoliated Vermiculite ..	30%
Sillimanite	20%
China clay	30%
Pikes K or like ball clay ..	20%

and in which said mixture has added to it water in sufficient quantity to produce on further mixing, a plastic mass.

3. A method according to Claim 1, in which the composition by weight of said plaque consists of:

Exfoliated Vermiculite ..	62%
China clay	19%
Pikes K or like ball clay ..	19%

and in which said mixture has water added to it.

4. A radiant burner plaque made in accordance with the method of Claim 1, 2 or 3.

5. A radiant burner plaque according to Claim 4, formed with about 250 holes per square inch of surface area, each hole having a diameter of the order of 1 millimetre.

6. A radiant burner plaque according to Claim 5, in which the holes are of slightly tapering cross-section, the large diameter ends of the holes being at the air/gas mixture exit ends thereof.

7. A radiant burner having a plaque or plaques according to any of Claims 4, 5 or 6.

8. A radiant burner substantially as described and illustrated with reference to the accompanying drawings.

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Radiation Burners.

We, RADIANT HEATING LIMITED, a British Company, and ARTHUR DOCKING, a British Subject, both of Radiant Works, Barnsbury Park, London, N.1, do hereby declare this invention to be described in the following statement :—

This invention relates to radiation or surface combustion burners of the kind in which an inflammable gas or vapour mixture is caused to pass under suitable pressure through a multiplicity of small holes in a thickness of refractory material and burn at the outlet surface of said material.

The object of the invention is the provision of an inproved burner of this kind, and the nature of the invention will be understood from the following description of one embodiment thereof.

In accordance with this embodiment the refractory material consists of a mixture of the following materials :—

Vermiculite	17%
Refractory powder	13%
China clay	27.5%
Silicate of soda	10.5%
Water	32%

The material may be made in the form of a plurality of rectangular slabs or plattens having a length and breadth of two or three inches and a thickness of say half an inch, each platten having a large number of small holes of say two millimeters or less in diameter formed through it, say 200 to 250 per square inch of surface.

In practice a number of the plattens are cemented, edge to edge into a cast iron container so as to constitute a single composite platten which closes one side of the container. The combustible gas or vapour is supplied to the container and flows out through the holes and is ignited at the outer surface of the composite platten. In the case of large size burners the cast iron container might accommodate say eight plattens.

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741,660 COMPLETE SPECIFICATION
1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

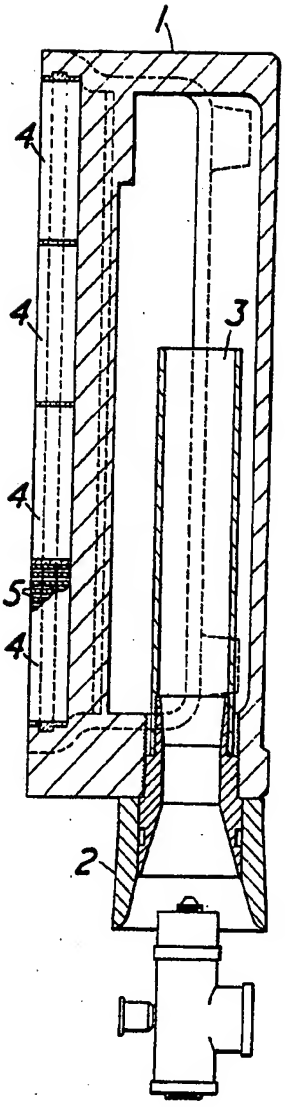

FIG. 1.

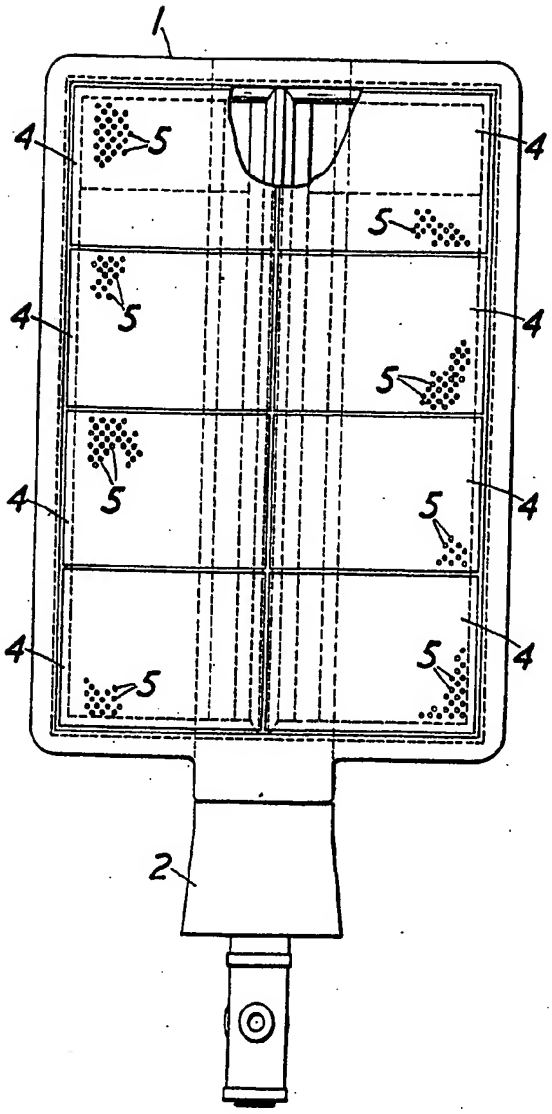

FIG. 2.